HOW DOES INVESTORS' PERCEIVED EASE OF INFORMATION ACCESS AFFECT THEIR INVESTMENT JUDGMENTS?

BY

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DISSERTATION

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ABSTRACT

By manipulating the perceived ease of information access through use of a search engine, I provide experimental evidence that investors are more likely to rely on information gist and use shallow processing after using an online search engine to access a firm's financial information. Results show that investors using a search engine to access a company's financial information were more likely to invest in a company with a higher likelihood of real earnings management (REM) than a company with the same net income but a lower likelihood of REM. On the other hand, investors who did not use a search engine were more likely to invest in the lower likelihood of REM company. Furthermore, investors who accessed financial information via a search engine judged the financial information more easily available, were more likely to reopen the financial information, and scored lower on the retention test. The study contributes to the accounting literature by showing that technologies that increase perceived ease of information access change how investors process and use financial information.

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I. INTRODUCTION

In the last 20 years, internet search engines (e.g. Google) have become an increasingly important part of the information environment. Google estimated that in 2013 they received more than 100 billion searches per month (Page 2014). Search engines are also one of the current information technologies upon which nonprofessional investors rely to find financial information. Indeed, Google search volume trends can be used to predict stock prices and trading volume, as well as financial crises (Da, Engelberg and Gao 2011; Drake, Roulstone and Thornock 2012). Although search engines have benefits, such as faster dissemination and increased accessibility of financial information for nonprofessional investors, they may also lead to unintended negative consequences on investors' decision making. In this study, I examine whether using online search engines to access financial information changes investors' information processing and judgments.

I predict that using a search engine will lead investors to engage in less effortful information acquisition and processing strategies. Sparrow, Liu, and Wegner (2011) coined the term "Google Effect" to describe the tendency for individuals to be less likely to acquire and retain information when they believe the information is easily reaccessible in the future. Search engines are almost always accessible to individuals through mobile technologies and have become like an extension of their memory for many of them. Therefore, I argue that accessing financial information via a search engine can lead to an increased belief that the information is easily accessible and available in the future which will lead to a reduced effort to acquire information. Further, in addition to search engines affecting information acquisition, I predict that the search engines will cause investors to be less likely to deeply process the financial information they access. Instead, they will engage in shallow level processing focused on the

high-level gist and overall valence of the financial information (Craik and Lockhart 1972; Craik and Tulving 1975; Kida and Smith 1995; Kida, Maletta and Smith 1998).

To test my predictions, I conduct an experiment that uses a 2x2 between-participants design. Participants from the Amazon Mechanical Turk (AMT) platform take on the role of prospective investors and evaluate a biotech company. Participants access the company's financial information either via a Google search (search engine condition) or via clicking the next button on the instructions page (control/no search engine condition) (see Appendix). Within the financial information, I hold the reported earnings constant and manipulate the likelihood that management used real earnings management (REM) to achieve these earnings by varying the company's R&D spending and revenue (Harris et al. 2016). Specifically, in the higher [lower] likelihood of REM condition, the firm decreases [increases] its R&D spending and has relatively lower [higher] revenue.

On the surface, a reduction in R&D spending decreases a company's current expenses, but with deeper consideration, one may surmise it may also be detrimental to a company's long-term potential. My theory suggests that when investors access financial information via a search engine, they will be more likely to rely on the gist and valence of a line item when making judgments. Therefore, in my setting, I expect that investors who accessed the information via a search engine will be more likely to perceive the positive gist of R&D expense reduction as an expense that went down, and less likely to fully consider the potential long-term harm that decreasing R&D might imply. This would lead to investors evaluating a company with a higher likelihood of real earnings management more positively compared to a company with the same net income but a lower likelihood of real earnings management. After observing the financial

information, participants assess the company's attractiveness as an investment opportunity and their likelihood of investment in the company.[1]

Results support my predictions. I observe that use of a search engine and likelihood of REM have an interactive effect on investment judgments. Specifically, investors who used a search engine to access the financial information were more willing to invest in the company with higher likelihood of REM than the company with lower likelihood of REM. Investors who accessed the same financial information without using a search engine were more willing to invest in the company with lower likelihood of REM than the company with higher likelihood of REM. Taken together, these findings suggest that investors who use a search engine engage in shallower processing of the acquired information compared to investors who did not us a search engine.

If participants in the search engine condition perceive the information as easier to re-access than participants in the control condition, then they should be less likely to retain the information after their first read through. Therefore, I expect that search engine condition participants will be more likely to reopen the information page during the judgment stage. In my supplemental analyses, consistent with this ease-of-access argument, I find that participants who accessed the information via search are more likely to reopen the income statement while making investment judgments. I also find that participants in the search condition perform worse on recall questions than participants in the control condition. Furthermore, I find that search condition participants evaluated the financial information as easier to access than those in the

[1] When providing their investment judgments, all participants are also given the option to reopen the income statement by clicking a link on the top of the page. In the post-experiment questionnaire, participants provide their assessment of the financial information's ease of access and answer several recall questions based on income statement line items.

control condition. Collectively, these supplementary findings provide additional support for my theoretical arguments: using a search engine appears to make investors believe that the information is more readily accessible in the future and decreases their information retention.

I also investigate whether search-engine-use frequency moderates the relationship between investor judgments and my search manipulation. Neuropsychology research suggests that extended use of computers and internet search engines can change brain reactions over time (Small, Moody, Siddarth and Bookheimer 2009, Dong and Potenza 2016). If the search engines prompt a different type of information processing, this effect is more likely to occur in individuals who use search engines more often in their daily lives, because the human brain can become conditioned to use a shallower processing based on the repeated stimuli of search engine use. Therefore, I examine whether shallow level processing after a search is more prominent for investors who use search engines more often. My results support the prediction that the effect of search engines on investors' judgments increases for individuals who use search engines more often.

In the supplemental analyses, I investigate whether investors' financial knowledge mitigates the effect of search engine use on their judgments. Results show that investors' financial knowledge does not mitigate this effect. Lastly, I also provide evidence that the effect of search engine use on investor judgments is driven by the act of using the search engine rather than accessing the information through a hyperlink.

This study makes several contributions to the academic literature. First, it extends accounting research that investigates the effects of information's ease of access on investors' judgments and decisions. Hodge (2001) shows that hyperlinking audited financial statements and optimistic unaudited information reduces the perceived distance between two sources, leading

investors to blend the information from both sources and rely more on the unaudited information while making a decision. Elliott, Hobson and White (2015) show that investors are more likely to rely on an easy-to-access summary measure despite the existence of an effortful measure that is more value-relevant. In my study, I show that accessing the financial information through a search engine increases perceived ease of information access, which in turn changes how investors process the information. Although this study cannot determine whether the costs of using search engines outweigh the benefits, it does inform investors about the unintended negative consequence of having easy and instantaneous access to financial information. Prior research indicates that informing individuals about a biased judgment process or a heuristic can reduce the effect on their judgments (Nisbett, Fong, Lehman, Cheng 1987; Morewedge et al. 2015). Informing investors about the "Google Effect" and the effects of using search engines for accessing financial information might improve their information acquisition and attention.

Second, the paper extends prior accounting research that investigates the effects of current technologies on investors (Miller and Skinner 2015). This literature examines how mobile information technology use (Brown, Stice and White 2015; Grant 2018; Brown, Grant and Winn 2018; Clor-Proell, Guggenmos and Rennekamp 2018), new financial information disclosure mediums such as social media (Cade 2018; Elliott, Hobson and Grant 2018; Elliott, Grant and Hodge 2018), and new formats such as XBRL (Hodge, Kennedy and Maines 2004) affect investor judgments. My study contributes to this research stream by providing additional evidence and theory on how use of information technologies can change investors' processing and judgments. I argue that use of technologies that increase investors' perception of ease of access can reduce the investors' processing depth.

Furthermore, my theory and findings complement recent archival research that finds that Google search volume is a good proxy for nonprofessional investor attention (Da et al. 2011; Drake et al. 2012). Da et al. (2011) show that increases in Google search volume predict price increases for the next two weeks with a reversal within a year. My study provides an explanation for the phenomena documented by Da et al. (2011): when investors access financial information through a search engine such as Google, they are more likely to use gist-based judgments. Use of such heuristics should generally result in more optimistic judgments due to the investors' increased susceptibility to management reporting tactics.

Lastly, the study contributes to the psychology literature by expanding on Sparrow et al. (2011) and the "Google Effect" theory by documenting that perceived ease of information access not only changes the information individuals acquire and retain but also changes their judgments. Additionally, one limitation of the prior psychology literature in this area is that study participants were not given an opportunity to return to the information during the experimental task or recall test. Therefore, it was not possible to assess whether the effect of perceived ease of access would still affect individuals' judgments in a more natural setting where they were given the opportunity to review the information again during the judgment task. In my setting, despite having the opportunity to reopen the financial information during the judgment task, decisions of the investors who used a search engine to access financial information were still different compared to investors who did not. This shows that having the ability to reaccess information does not eliminate the effect of perceived ease of access on judgments.

Next, Section 2 discusses background and develops the theory. Section 3 describes my experiment. Section 4 discusses the results of the hypothesis test and additional evidence of the underlying theory. Section 5 discusses supplemental analyses, and Section 6 concludes.

II. BACKGROUND AND THEORY DEVELOPMENT

Search Engine Use

In the last 20 years, the advances in information technology changed the landscape of how individuals access and store information. One of the most important developments was the introduction of "natural language query" based search engines, with it individuals no longer needed to remember an address for a website instead they could type a relevant keyword and get the link for the website. However, a major shift came with the introduction of Google, which used its proprietary link importance ranking technology. Overtime, Google has become one of the largest sources of information in the world. It was estimated that in 2013 Google accounted for 25% of US web traffic and in an average day more than 60% of web-enabled devices exchanged traffic with Google's servers (Kerr 2013). A recent outage in Google service demonstrates how heavily it is relied on for information access. In 2013, a minute-long Google outage caused a drop in internet traffic by 40% (Svetlik 2013). Lastly, research reveals that the search volume for certain terms can be used as a proxy for information demand of the general public (Askitas and Zimmerman 2009; Ginsberg et al. 2009; Goel, Hofman, Lahaie, Pennock and Watts 2010; Choi and Varian 2012; Preis, Moat and Stanley 2013; Curme, Preis, Stanley and Moat 2014).

Search engines also play a large role in investors' financial information access. Both Google and Yahoo have dedicated finance websites where investors can easily access summary financials as well as stock price information through a simple ticker sign or company name search. Although how much of investors' information traffic comes from Google and other search engines is unknown, there is evidence that investors utilize these websites as one of their primary portals for financial information. For example, recent studies show that search volume in

Google and Yahoo for company ticker signs as well as company names are predictive of trading volume (Da et al. 2011; Bordino et al. 2012). Additionally, Da et al. 2011 argue that Google search is a good proxy for nonprofessional investors' attention since they also find that an increase in Google search volume predicts higher prices for the next two weeks with a price reversal within a year. Furthermore, Drake et al. (2012) find that Google search volume for companies' ticker sign and name can also be used as a proxy for investor information demand. They show that investors search for firm-related terms increases two weeks prior to earnings announcements and peaks on announcement dates. They also show that higher search volume during a couple of days before announcements is negatively correlated with earnings shocks. Lastly, Fricke, Fung and Goktan (2014) demonstrate that Google search volume predicts market reaction for the earnings surprises. These findings indicate that investors utilize search engines to access financial information.

Despite Google's and other search engines' prominence as primary sources of information for investors, very little is known about how using the search engines affect their judgments. One reason why using search engines can lead to different judgments is that they prime instantaneous and easy availability of the information. On average, search engines provides search results in a fraction of a second (Google 2017) and coupled with the ability to use search engines everywhere with the help of mobile technologies, using a search engine could prime individuals to perceive that information will always be easily available for use. The next section discusses how this prime of ease of access changes investors' information acquisition and processing, and how this changes their investment judgments.

Perceived Ease of Access and Depth of Processing

Carr (2008, 2011) argues that, by making information easily and instantaneously available, Google and other current information technologies reduce individuals' willingness to pay attention and commit to information. Sparrow et al. (2011) present their theory of the "Google Effect," which is supported by several experiments that demonstrate the effect of perceived ease of information access on individuals. They hypothesize and find that when individuals think that a piece of information is saved on a computer, they are less likely to retain the information. Sparrow et al. (2011) argue that computers and the internet have become a "transactive memory source" for humans since we began to constantly expect to access any type of information instantly.[2] This causes individuals to dismiss responsibility for retaining information; they only have to focus on remembering how to retrieve the information from the internet rather than the information itself.

Numerous studies focus on the effects of perceived ease of reaccess, including its impact on memory (Kaspersky 2015), on information acquisition (Henkel 2014), and on the depth of focus on details (Eskritt and Ma 2014).[3] Furthermore, Bhargave, Mantonakis and White (2016) demonstrate that knowledge of online availability of product information increases consumers purchasing intentions due to increased confidence.

[2] Transitive memory system is defined as "…a set of individual memory systems in combination with the communication that takes place between individuals" (Wegner 1986 p.186)

[3] In a similar vein, screen and electronic reading literatures also report that using screens for reading reduces performance in recall and judgment tasks compared to paper reading (Morineau, Blanche, Tobin, and Guéguen 2005; Daniel and Woody 2013; Mangen, Walgermo and Bronnick 2013; Lin, Wang and Kang 2015; Singer and Alexander 2017). The literature on the electronic reading claims that one reason for the low recall performance when using electronic medium is that individuals might be primed with a different processing style (Ackerman and Goldsmith 2011). They argue that while the electronic medium primes a less effortful processing, paper primes effortful processing and learning (Ackerman and Goldsmith 2011; Shaikh 2004; Spencer 2006; Tewksbury and Althaus 2000). However, different than the "Google Effect" theory, they argue that this different reading prime with use of electronic medium comes from being used to reading less important short messages on the electronic medium rather than increased perceived ease of access (Ackerman and Goldsmith 2011).

I argue that this reduction in retention performance associated with perceived ease of information access can be caused by shallow level processing. Literature on levels-of-processing provides evidence that as individuals process information at a deeper level their retention performance increases (Craik and Lockhart 1972; Meunier, Millspaugh, and Meunier 1974; Craik and Tulvig 1975, Craik 2002).[4] Based on this, I argue that when individuals believe that the information is easily available again in the future, they pay less attention and process the information less deeply, which leads to a reduced recall.

Previous research on the perceived ease of information access provides evidence in support of the shallow processing argument. For example, in a study by Eskritt and Ma (2014) participants who took notes for a card pairing game scored lower when their notes were unexpectedly taken away, compared to participants who did not take notes. More interestingly, participants who took notes failed to remember the location of pairs but performed as well as the participants who did not take notes while recalling general identification information about the cards. Similarly, in Sparrow et al. (2011) when participants were told in which folder each piece of information was saved, they were more likely to recall folder names, rather than the factual information pieces that they were asked to recall.[5] These findings indicate that by increasing individuals' perceived ease of access, information technologies can prompt a different processing style and change what type of information is retained. When individuals believe that they can easily access the information again, they retain surface level information but pay less attention to and retain fewer details (Sparrow et al. 2011; Eskritt and Ma 2014).

[4] Depth of processing is defined as the amount of meaning extracted from the information during the encoding stage (Craik and Lockhart 1972; Meunier, Millspaugh, and Meunier 1974; Craik and Tulvig 1975).
[5] In Sparrow et al. (2011) folder names were specifically selected to be unrelated to the information participants needed to remember.

Considering that Google and other search engines are technologies that make information easily accessible almost everywhere, using an online search engine can increase investors' perceived ease of financial information access.[6] This, in turn, can prime investors to engage in a more surface level (shallow) information processing style.

Hypothesis

Evidence of shallow processing in an investment setting would be investors relying on broader classifications of line items, rather than detailed implications of the line items, while making an investment judgment. Kida and Smith (1995), and Kida, Maletta and Smith (1998) define "gist" as the broad underlying constructs and evaluative judgments that are easily retrievable forms of encoded representations. I argue that investors who accessed information via a search engine will form their investment judgments based on: (i) the broader classification of line items (such as costs or revenues) rather than details of the actual line items; and (ii) the valence of line items compared to previous year.[7]

My experiment utilizes a real earnings management setting to provide evidence of processing difference between investors who googled the company and investors who did not use a search engine. For example, an investor who googled the company to access financial information would be more likely to focus on R&D's classification as an expense, rather than the details of its role in the company's future profitability (Sougiannis 1994; Lev and Sougiannis

[6] Dong and Potenza (2015) present evidence in support of this argument. They show that individuals react differently to internet searches than traditional book searches; they suggest that the internet facilitates the information acquisition process but at a cost of recall accuracy. Although there are other technologies that might prime the feeling of information's ease of access, I specifically focus on Google since it is widely used and "Googling" has become a common step in nonprofessional investors' information gathering processes. Therefore, I argue that the Google brand name and website layout should lead to an increased feeling of information's ease of access. I also expect that the same theory should be applicable to other technologies that might prime the feeling of information's ease of access (e.g., mobile phones and online reading).

[7] By valence I mean whether the change in the line item was positive or negative compared to the previous year.

1996).[8] Consequently, the investor is more likely to judge an R&D spending decrease favorably (i.e., an expense that went down), despite the potential long-term damage that such a decrease implies for the future profitability of the company.

In addition, in the experiment, I also vary the magnitude of the gross revenue increase to keep the net income level constant across conditions. Based on my theory, investors who accessed the financial information will be more likely to base their judgments on the valance of the changes in the line items rather than the magnitude of the change compared to investors who did not use a search engine. As a result, I expect search engine condition investors to be indifferent to the magnitude of the revenue increase. Therefore, in my experimental setting, I predict that investors who accessed financial information via a search engine to be more likely to invest in a company that potentially engages in real earnings management through reduction in R&D spending (higher likelihood of REM), relative to a comparable company with the same net income and higher revenue increase that did not cut the R&D spending (lower likelihood of REM).[9] Conversely, I expect investors who did not use a search engine to be more likely to invest in the company that has lower likelihood of REM, relative to a company that has a higher likelihood of REM. I formalize my predictions in the hypothesis below.

[8] There is also evidence that even analysts can exhibit functional fixation based on income statement item classification (Hopkins 1996; Hirst and Hopkins 1998). Although investors tend to perceive R&D expenditures as favorable (Sougiannis 1994; Lev and Sougiannis 1996), use of a search engine magnifies the functional fixation on the R&D's classification as a cost.

[9] Kaufman and Flanagan (2016) argue that digital platforms trigger a lower level construal. Based on this, it can be argued using a search engine can activate a lower level construal, and therefore, investors might be prioritizing short term gains and evaluate a decrease in R&D more positively (Trope and Liberman 2010). However, in my experiment all participants used a digital platform to access financial information. Furthermore, construal level theory does not account for why search engine condition investors would be indifferent to the magnitude of the revenue increase nor why they would perform worse on retention questions compared to the control condition.

Hypothesis: Investors in the search engine condition [control condition] will evaluate the higher [lower] likelihood of REM company more favorably than the lower [higher] likelihood of REM company.

III. EXPERIMENTAL METHOD

Design

To test my prediction, I conduct a 2x2 between-subject experiment, with participants' method of financial information access (search engine vs. control) and the likelihood that company's management is engaging in real earnings management (higher likelihood of REM vs. lower likelihood of REM). I manipulate how participants access company information by either making participants conduct a Google search to access the company's financial information (search engine condition) or the financial information is given to them in the next page (control condition). The Appendix A presents excerpts from experimental materials showing how the search engine is operationalized. Although I expect my theory to generalize to all search engines (including EDGAR's), I operationalize search by using Google because 83% of PEW research survey respondents indicated that they use Google as their main search engine (Purcell, Brennell, and Rainie 2012). In addition, Google search volume is also used as an individual investor attention proxy (Da et al. 2011; Drake et al. 2012).

In the experiment, as an investment opportunity, participants read information about a biotech company. For the likelihood of real earnings management manipulation, I manipulate whether company's net income grew with or without a cut in the R&D, similar to Harris et al. (2016). R&D expenditures of a biotech company can be very important for the future profitability and the survival of the company. Therefore, a cut in the R&D spending should be perceived as less favorable. In both higher and lower likelihood of earnings management conditions, the company shows an upward earnings trend in the past three years and both conditions show the same net income for all three years. In the lower likelihood of REM condition, the company is increasing its revenue and its R&D spending in the current year. In the

higher likelihood of REM condition, company has a smaller revenue growth compared to previous years, and it cuts its R&D spending to meet the net income growth trend. In both conditions, the company's cost of goods sold increases with the same rate as revenue increase. The Appendix B presents excerpts from experimental materials showing how the likelihood of real earnings management is manipulated.

Participants

Participants were 295 Amazon Mechanical Turks (AMT). I use AMT participants since their knowledge level matches with my task complexity (Libby, Bloomfield and Nelson 2002).[10] My investment task would be classified as low complexity (Elliott, Hodge, Kennedy and Pronk 2007) and recent literature demonstrates that AMT workers are an appropriate proxy for retail investors (Farrell, Greiner, and Leiby 2016). Participants were rewarded $2.00 for their participation. Participants had taken 1.55 accounting classes and 1.34 finance classes on average, and about 70 percent of the participants had previously evaluated a company's financials. Approximately 50 percent of the participants indicated that they had previously traded securities. Prior research has used AMT participants with similar demographics as a proxy for individual investors performing a comparable task (Rennekamp 2012). At the end of the experiment, participants also filled out Finra's financial literacy test (Finra n.d.), on which participants scored an average of 4.22 out of six which is higher than the U.S. national average of 3.16 (Li et al. 2016).

[10] I recruited 306 AMT participants, 11 participants were excluded from analyses; three for failing both attention checks, four for spending less than five minutes on the materials, and lastly four for scoring zero out of six financial literacy questions. In the first attention check question, I asked participants to select "Yes" if they are a robot. In the second attention check question, I asked participants to select "40" to continue the task. Only four participants failed both attention checks. I also exclude participants who spent less than five minutes since in the pilot run as well as in the experiment the average time spent on the materials was more than 15 minutes. Test for my main hypothesis is inferentially and statistically similar if I include these data points.

Procedures

Participants enrolled in the experiment through a job posting on the AMT website. Participants were told that they were a prospective investor in a biotech company called ProTech that specializes in 3-D printing of human tissues for drug testing. After participants read the scenario and the company background, participants who were in the search condition were asked to search the company in the Google search box found in the next screen. To make the search process realistic and externally valid, I created a search screen that looked similar to the Google webpage with similar functionalities. The page contained the Google brand name on top with the search box underneath it (please refer to Appendix A Panel 1). Similar to the Google search bar, as the participants typed they received keyword recommendations which they could select a keyword rather than typing up the entire keyword. Once search condition participants finished entering a keyword that contained the company name or the ticker sign, they were taken to the search results page.[11]

The search results screen also resembled to Google search results screen, where on top left corner the Google brand was displayed with the search bar right next to it which included the keyword the participant just used (please refer to Appendix A Panel 2).[12] Underneath the logo, participants were given a link similar to Google hyperlinks to be able to access the company's summary income statement. When the link was clicked, the associated information opened on the following screen. Participants who were in the control condition skipped the search task and

[11] The participants who entered a keyword that does not contained the company name or the ticker sign, they received a warning text telling them to use a company related keyword instead.

[12] The search bar on top right corner of this screen showed the actual keyword that participant used. The program took the value entered in the search screen and created an image of a search bar with the word inside in the following search result screen.

were directly taken to the financial information page. Other than search and links, the information participants received was identical between search and control conditions.

Participants in the lower likelihood of REM condition (please refer to Appendix B Panel 1) received an income statement with higher revenues, and increased research and development expenses compared to the previous year. In contrast, participants in the higher likelihood of REM condition (please refer to Appendix B Panel 2) received an income statement with lower current year revenues compared to lower likelihood of REM condition, and reduced research and development expenses compared to the previous year. In both conditions, the net income was held constant.

After financial information was reviewed, participants were asked to make investment judgments. During this stage, participants had access to links which allowed them to review background and financial information (please refer to Appendix C). As my main dependent variable, participants assessed the company's attractiveness as an investment opportunity and likelihood that they would invest in the company. After collecting dependent variables, participants answered several process measures, retention, manipulation, and attention check questions.[13] Finally, participants provided additional information regarding their computer and investment experience. See Appendix D for the full experimental instrument.

[13] Attention check questions can trigger systematic processing (Hauser and Schwarz 2015). To prevent my dependent variables being affected by a change in processing style, the attention check questions were placed after the collection of my dependent variables and most of my main process measures.

IV. RESULTS AND PROCESS EVIDENCE

Test of Hypothesis

I predict that investors who used a search engine to access financial information will be more reliant on gist information compared to investors who did not use a search engine. In my setting, this would be evidenced by participants who are in the search engine condition evaluating the higher likelihood of REM company more positively compared to lower likelihood of REM company while participants who are in the control condition evaluating the lower likelihood of REM company more positively compared to the higher likelihood of REM company.

After observing the company financial information, participants responded the following two questions: (i) "How attractive is ProTech as an investment opportunity?", (ii) "What is the likelihood you would consider ProTech as a potential investment?" using 101-point slider scale with endpoints 0 ("Not at all attractive") - 100 ("Very attractive") and 0 ("Not at all likely") - 100 ("Very likely").[14] I use an analysis of covariance (ANCOVA) model with the average of participants' responses to the above two questions as the dependent variable (Investment Judgment), search and likelihood of REM as independent variables and participants financial literacy score as the covariate.[15] Panel A of Table 1 presents descriptive statistics for the participants' investment judgments while Panel B of Table1 presents the results of the ANCOVA. Results reveal a significant interaction between search and likelihood of REM

[14] The results of my main ANCOVA remain inferentially and statistically same if I use the factor score of the both measures as dependent variable (p-value=0.01, one-tailed). The two-way interaction remains significant if I use the likelihood of investing or the attractiveness of the company as dependent variable (all p-values<0.02, one-tailed)

[15] I add the financial literacy score as a covariate since it has a positive significant effect on investment judgments (Financial literacy score p-value<0.01). My results are directionally and statistically similar if I remove the covariate from the model (the ANOVA model interaction term p-value=0.02, one-tailed).

manipulations ($F_{1,290}$=5.27, p-value=0.01 one-tailed). [16] The significant search and likelihood of REM interaction is displayed graphically in Figure 1. An interaction is consistent with my hypothesis that using search leads to different investment judgments.

The results of simple effects tests support my theory as well. In Table 1 Panel C, the difference in investment judgments between lower likelihood and higher likelihood of REM companies for search engine conditions is significant (73.41 vs. 78.00; t-statistic=-1.86, p-value=0.03 one-tailed); furthermore, the difference in investment judgments between the lower and higher likelihood of REM companies for control conditions is marginally significant (82.25 vs. 78.54; t-statistic=1.38, p-value=0.08 one-tailed). The results provide evidence that search engine investors engaged in shallower processing compared to control group investors. Investors in the search engine condition evaluated the company with potential REM more favorably than the company with the increased R&D spending (lower likelihood of REM). While control condition investors preferred the company with the lower likelihood of REM over the higher likelihood of REM company.

Likelihood of Going Back to the Information Page

In the experiment, participants are not told beforehand that they will have access to the income statement information while entering their judgments; however, the income statement information can also be accessed again during the judgment stage by clicking a link that reopens the income statement. If my manipulation of search increases participants' perceived ease of access of financial information, then participants in the search condition would be less likely to pay attention to information presented during the information stage because of their expectation

[16] I use one-tailed p-values for my directional predictions, all other p-values are two-tailed unless specified otherwise.

to find the information easily in the future. As a result, I expect investors who accessed information via a search engine to be more likely to click the link that reopens the income statement in the judgment stage.

I use an indicator variable as my dependent variable that takes the value of one if a participant clicks the link and zero if a participant does not click the link and my independent variable is an indicator variable for search. Panel A of Table 2 presents the descriptive statistics for the likelihood to reopen the income statement, Panel B presents logistic regression. The percentage of participants who reopened the income statement are displayed graphically in Figure 2. The analysis shows that use of a search engine significantly affects participants likelihood of clicking the link (β=0.48, p-value=0.02, one-tailed). Participants who accessed information with a Google search are more likely to click the link that reopens the income statement in the decision page compared to the participants who did not use a search engine (44.1% vs. 32.7%). [17]

Recall Performance

Psychology research shows that the perceived ease of access leads to reduced recall performance. For example, in Sparrow et al. (2011), participants who believe that the information is saved to a folder performed worse at remembering the information, compared to participants who did not save the information. Similarly, in my experiment, I expect to find that participants within the search conditions to perform worse in recall questions compared to those within the control conditions.

[17] I also run the logistic regression with the inclusion of the likelihood of REM variable as well as the interaction between likelihood of REM and search variables. As expected, neither likelihood of REM nor the interaction coefficients are significant (both p-values>0.1, untabulated), while coefficient for search variable remains significant (p-value 0.02, one tailed, untabulated).

In the post-experiment questionnaire, participants were asked eight recall questions on income statement items regarding the level of and changes in: revenues; net income; research and development; and selling, general and administrative costs.[18] Table 3 Panel A presents the descriptive statistics for the average recall score of the participants while Panel B presents the results of the ANOVA. As predicted, I find that recall performance difference is significant (F-value$_{1,293}$ = 2.96 p-value=0.04, one-tailed), where participants within the control conditions performed better (Mean=4.35) than participants within the search conditions (Mean=3.88). Therefore, in addition to investors' use of search engines affecting their judgments, these results reveal that it also impacts investors' acquisition and retention of financial information.

Daily Use of Search Engines

Prior literature suggests that over time, use of information technologies might rewire the human brain and change the way people acquire and retain information (Carr 2008, 2011; Storm, Stone and Benjamin 2016). In an exploratory study, Small et al. (2009) found that during an internet search, different parts of the neural circuitry becomes activated compared to reading text from paper; however, this effect only exists in individuals who have more experience with the internet. Small et al. (2009) argue that this result provides some evidence that prior experience with search engines and the internet may change the brain's responsiveness in neural circuits controlling decision making and complex reasoning. Dong and Potenza (2016) document that, after six days of practicing internet searches, participants' brain activation was different in the post-test recall compared to the control group who did not practice internet searches. These findings suggest that the human brain can become conditioned to a shallower processing style

[18] Participants received eight recall questions in total, two per each income statement line item mentioned.

based on the repeated stimuli of search engine use. Therefore, I expect that the effect of using a search engine on investors' judgments will be moderated by their frequency of search engine use. I also expect to find that the effect of using a search engine to access financial information to be present only for the subset of individuals who use search engine more frequently.

To test this, I collect a measure called "daily search engine use" which is the self-reported number of times participants' use of search engines per day.[19] I run a 3-way ANCOVA with search, likelihood of REM and median split of the daily search engine use as independent variables, and the investment judgment as dependent variable.[20] If the three-way interaction between my manipulated variables and daily search engine use is significant this would mean that the effect of search engine use on investor judgments depends on investors' search engine use frequency. Panel A of Table 4 presents descriptive statistics for the participants' investment judgments partitioned based on median daily search engine use while Panel B of Table4 presents the results of the 3- way ANCOVA. I find that the three-way interaction is marginally significant ($F_{1,286}$=1.85, p-value=0.09, one-tailed). I also split the sample into two, based on median daily search engine use, and rerun my main two-way ANCOVA for both samples. Panel C Table 4 reports the results of the interaction term for the two split sample two-way ANCOVA's. For the participants who use search engines more often, the interaction between search manipulation and likelihood of REM in the two-way ANCOVA is significant ($F_{1,145}$=7.72, p-value<0.01, one-

[19] In the post experiment questionnaire, participants answered the question "On average, how many times a day do you search for information on search engines such as Google?" with a free response box that only accepts positive integers. An average participant uses search engines 13.5 times a day while the median search per day was 10. Only one participant entered zero and two participants entered a number higher than 100. I replace the two very high outlier values with 100.

[20] To be consistent with my previous tests, I use an ANCOVA model with financial literacy as the control variable. My results are inferentially similar if I remove the control and run a 3-way ANOVA model instead (p-value=0.05).

tailed). However, for the participants who use search engines less often, the interaction term becomes insignificant ($F_{1,140}$=0.39, p-value>0.1).

As an additional test of moderation, I also estimate the linear regression model shown below:

$$Investor\ Judgment = \beta_0 + \beta_1 Search + \beta_2 REM + \beta_3 NumSearch + \beta_4 Search * REM + \beta_5 NumSearch * Search + \beta_6 NumSearch * REM + \beta_7 NumSearch * Search * REM + \beta_8 Financial\ Literacy + \varepsilon$$

Search and REM variables are indicator variables based on my manipulations. Search takes the value of "1" if the participant googled the company and "-1" if they were in the control condition. Similarly, REM takes the value of "1" if participant was in the higher likelihood of REM and "-1" if participant was in the lower likelihood of REM condition. I use the raw number of daily search use "NumSearch" as the third independent variable. I also include the Financial literacy as a control. My coefficient of interest is the three-way interaction between self-reported number of searches per day, Search and REM. If the interaction coefficient's sign is positive and significant this would mean that the effect of search engine use on investor judgments increases with the investors' daily use of search engines. Table 4 Panel D presents the results of the OLS regression. I find that the coefficient for the three-way interaction is positive and significant (β=0.87, p-value=0.07 one-tailed). This finding is in line with my theory that search engine use frequency moderates the effect of using search engines to access financial information.

Combined, these results indicate that the effect of search engine on investor judgments is moderated by the investors' search engine use frequency. Investors who use search engines more frequently are more likely to engage in shallower processing when they access financial

information through a search engine.[21] In other words, as investors use search engines more often—in life and in work—they become more conditioned to perceive that information will be easily available and accessible to them in the future after using a search engine which in turn affects their judgments.

Perceived Ease of Access

My theory argues that using online search should prime the idea that information is easily accessible and will be available in the future. If using Google and other search engines affect investors' perception of ease of information access and future availability of information and this perception is a conscious one, then participants in the search engine condition should have higher ease of access assessments.

After providing their investment judgments, participants answered two Likert style questions: (i) How accessible ProTech's financial information was, and (ii) How strongly they believed that the information would be available in the later stages. I average the results from the above two questions and build my dependent variable "Ease of Access" measure and run one-way Analysis of Variance (ANOVA) model with search as my independent variable. Table 5 Panel A presents descriptive statistics while Panel B provides the results of the one-way ANOVA model. I find that participants ease of access assessments are higher in the search engine conditions compared to control conditions (75.80 vs. 73.07, F-value$_{1,293}$= 1.96, p-value

[21] Some may question the usefulness and applicability of my theory, arguing that they cannot be generalized to people who do not use these technologies on a daily basis. While this is true, I would argue that the population of interest—investors—are increasingly tech-savvy, and that among them, there are fewer and fewer people for whom these findings would not apply. As technologies including search engines become a more integral part of people's lives, investors and otherwise, my findings will be all the more relevant.

0.08, one-tailed). This result provides some evidence that use of search engines are priming the ease of access of the information and this prime is partially a conscious one.

V. SUPPLEMENTAL ANALYSIS

Existence of a Link vs. Search Engine

Accessing non-audited financial information via hyperlinks changes how investors perceive the information (Hodge 2001). Using hyperlinks also leads to increased cognitive load and different reading style. Furthermore, the use of hyperlinks in tandem with a mobile device screen reduces information acquisition and reduced information integration (Grant 2018). So, one possibility is that ease of information access can be primed just by the existence of hyperlinks rather than the act of googling. To test whether the googling itself or the mere existence of hyperlinks leads to increased perception of ease of access, during the experiment, I collected data for two additional conditions with link-only access (i.e., link-only conditions). The difference between the link-only conditions and the control conditions is that participants in the link-only conditions must click a link to be able to access the company's financial information.

If using a search engine is what mainly primes ease of information access, rather than the existence of hyperlinks, then I expect to replicate my main result and find a significant interaction between search engine and likelihood of REM (while using the link-only conditions instead of control conditions). To confirm, I run a two-way ANCOVA by using link-only and search engine conditions with financial literacy as a covariate. Table 6 Panel A presents the descriptive statistics of link only and search engine conditions while Panel B presents the results of the ANCOVA model. The interaction term between search and likelihood of REM remains marginally significant ($F\text{-value}_{1,289}=2.03$, p-value=0.08, one-tailed). This result provides

additional evidence that using a search engine, rather than links, is what primes the ease of information access.[22]

Similarly, if using a link to access financial information is not sufficient to prime ease of information access, then the interaction between link existence and likelihood of REM should not be significant. As a test, I run a two-way ANCOVA model using link-only and control conditions with link and likelihood of REM manipulations as independent variables, investment attractiveness as the dependent variable and financial literacy score as a covariate. As a result, I find that the interaction between link existence and likelihood of REM is insignificant ($F\text{-value}_{1,294}=0.62$, p-value= 0.43, untabulated), thus providing evidence that link alone is insufficient to prime ease of information access.[23, 24]

The Effect of Financial Literacy

Understandably, one might argue that the effect of search engine use on investor judgments can be mitigated by increased financial knowledge. For instance, in the elaboration likelihood model, knowledge is an important input that affects individuals' likelihood to deeply process information (Petty and Cacioppo 1986). To test whether investors' financial knowledge mitigates the effect of search engine use on their judgments, I rerun my hypothesis test using only the participants who were ranked at the top half of the sample for the financial literacy test performance (individuals who scored five or above). If I still find the support for my hypothesis—that the two-way interaction between likelihood of REM and search is still significant by using the more financially literate sample—this indicates that financial literacy

[22] I use an ANCOVA model to be consistent with my main hypothesis test. I also rerun the test without the financial literacy covariate. My results are statistically and inferentially similar with using the two-way ANOVA model.
[23] Since I have no directional prediction for the model, I use two-tailed p-values.
[24] I use an ANCOVA model to be consistent with my main hypothesis test. I also rerun the test without the financial literacy covariate. My results are statistically and inferentially similar with using the two-way ANOVA model.

does not mitigate the effect of search engine use on investor judgments. Table 7 Panel A presents descriptive statistics of the high financial literacy score participants while Panel B provides the replication of the main hypothesis test with using the high financial literacy score participants. As a result, I find that the interaction between the likelihood of REM and search remains significant ($F_{1,138}$=6.34, p-value<0.01, one-tailed).[25] Simple main effects also remain directionally and statistically similar with the more financially literate sample (both p-values <0.1).

Lastly, I run a linear regression with a three-way interaction term between likelihood of REM, search engine, and participants' financial literacy scores. If financial literacy mitigates the hypothesized effect of perceived ease of access, then I would expect to find a significant three-way interaction coefficient. As a result of my analysis, I find that the three-way interaction is insignificant (β=0.21, p-value=0.76, untabulated). As a follow up test, I also run an ANOVA model with the median split financial literacy score and my two manipulated variables as independent variables, and investor judgment as my dependent variable. The three-way interaction variable in my ANOVA remains insignificant ($F_{1,287}$=0.43, p-value=0.54, untabulated). These findings indicate that financial literacy does not mitigate the Google Effect on investor judgments and the observed effect is not due to subjects' lack of financial sophistication.

[25] I also run the two-way ANOVA models with samples where I delete participants who scored three and below, and two and below. The two-way interaction between likelihood of REM and Search remains significant in all three models.

Time Spent

Using a search engine can lead to less effortful processing of information as well as lower retention; however, a priori it is not very clear whether this effect is due to less time spent reading the information or just lower cognitive effort. For example, levels of processing literature argues that more time spent on reading or observing does not warrant a deeper processing of the information (Craik and Tulving 1975). To test whether using a search engine reduces time spent reading information, I run a one-way ANOVA with the time participants spent on the income statement page as my dependent variable and search engine indicator variable as the independent variable. I find that the time spent on the income statement is not different between search and control conditions ($F\text{-value}_{1,291}=0.162$, p-value=0.69, untabulated). The lack of significant difference between conditions shows that the use of a search engine may not influence time spent on reading the financial information but affects the cognitive effort in acquiring and processing it.

VI. CONCLUSION

I present a theory and experimental evidence suggesting that investors' judgments can be affected by their use of search engines to access financial information. Overall, my results show that when nonprofessional investors use a search engine to access financial information, they are more likely to rely on high-level information and more likely to invest in the company that potentially manage its earnings through a decrease in its R&D spending compared to a company with same net income but also increased its R&D spending. The results support my theory that online search increases the perceived ease of accessibility of financial information, which in turn changes the information processing of the investors from a more systematic to heuristic based processing. In my supplemental analyses, I find that when investors use a search engine, they are more likely to return to the information screen while making a judgment, and they perform worse on recall questions compared to investors who did not use a search engine.

I contribute to the accounting literature that investigates the effects of information medium (Libby and Emett 2013) and information's ease of access on investors' decision making (Hodge 2001; Elliott et al. 2015). In my study perceived ease of access is manipulated for the whole income statement rather than specific income statement items such as net income. I show that accessing the financial information via an online search can increase investors' perceived ease of access, which in turn changes what type of information they rely on while forming a judgment. My results provide evidence that, in addition to the presentation medium, investors' information accessing medium can also have effects on investors' processing and judgments.

Second, the paper also contributes to the accounting literature which investigates the effects of current technologies on investors (Miller and Skinner 2015). Grant (2018) shows that mobile investing can have a negative effect on investors' integration of information and

judgments when investors can choose which piece of information they want to see through tabs. This study would provide additional evidence that over reliance on information technologies that increase the information's perceived ease of accessibility can be harmful to investors' processing and judgments. I also provide a new theory why investors' integration of information might be hampered through use of technology and search engines. I argue that use of technologies that increase investors' perceived ease of information access can change investors' information acquisition and processing. Furthermore, the study complements the recent archival literature, which shows that Google search volume is a good proxy for nonprofessional investor attention (Da et al. 2011; Drake et al. 2012).

Lastly, I also contribute to the psychology literature that is concerned with how using computerized medium affects human cognition by showing that the "Google Effect" extends beyond memory and that it also affects judgment and decision-making quality. Sparrow et al. (2011) show that the expectation of easy reaccess to information changes how individuals process and what type of information they can retrieve. In this study, I expand on Sparrow et al. (2011) by documenting that, despite individuals having information access during their judgment and decision-making task, their judgments were affected by their perceived ease of access.

The study provides several opportunities for future research. First, psychology research shows that when information is easily available individuals switch to more perceptual-motor strategies as opposed to more cognitively costly memory strategies while performing tasks (Morgan, Waldron, King, and Patrick 2007). I provide additional evidence that supports this claim in an investment setting. In my experiment, participants were asked to make decisions based on single source of information; however, in the financial markets, investors are overloaded with information from multiple sources. Considering that investors are boundedly

rational, future research can focus on how this shift in cognitive strategies might impact investors' decision making when the information environment is very rich and investors have access to multiple different information sources. Future research can investigate whether using search engines and more perceptual-motor intensive strategies improve information integration from multiple sources by reducing the cognitive load.

My results suggest that when investors believe that information will be easily accessible and available in the future they switch to less cognitively costly processing style which might also make them more susceptible to other heuristics. Future research could be valuable in offering additional insight as to whether using a search engine exacerbates the effects of other known heuristics. Lastly, previous research shows that summarizing and paraphrasing leads to deeper processing which in turn might debias the effect of using a search engine. Future research can test whether note taking reduces the judgment effect of using search engines.

FIGURES AND TABLES

FIGURE 1

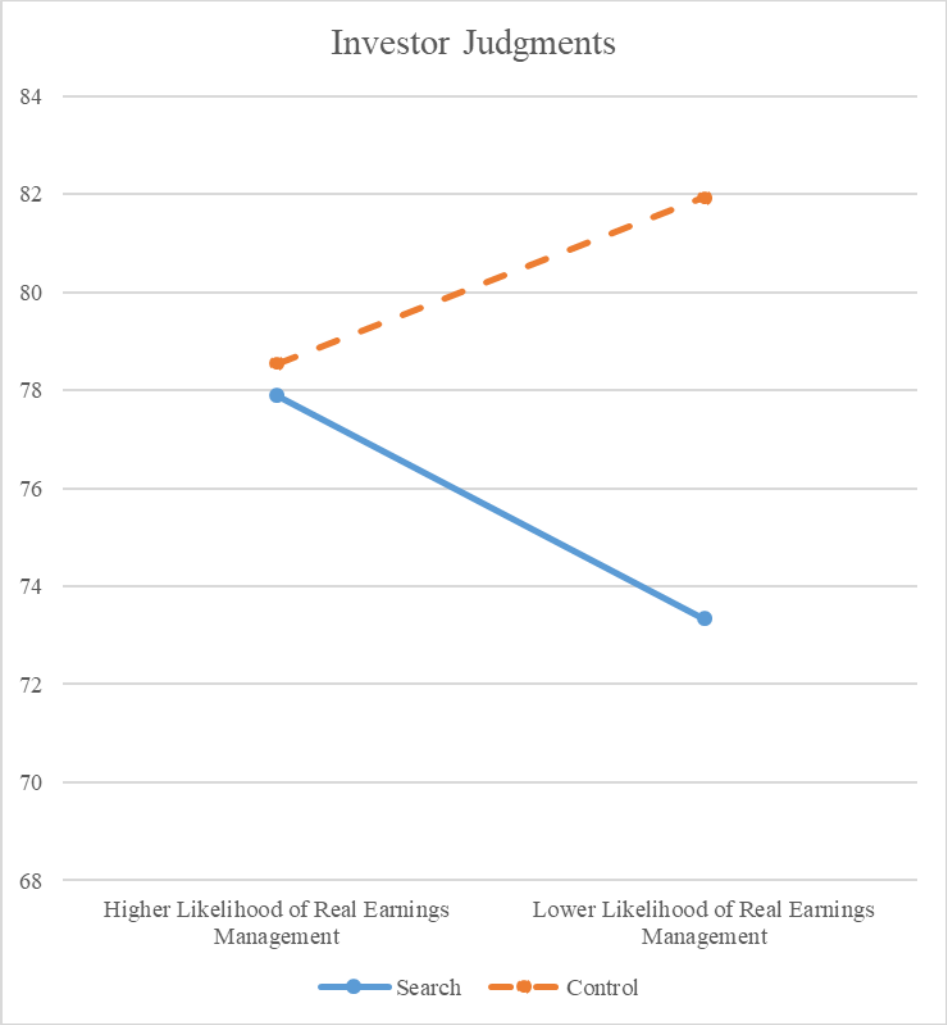
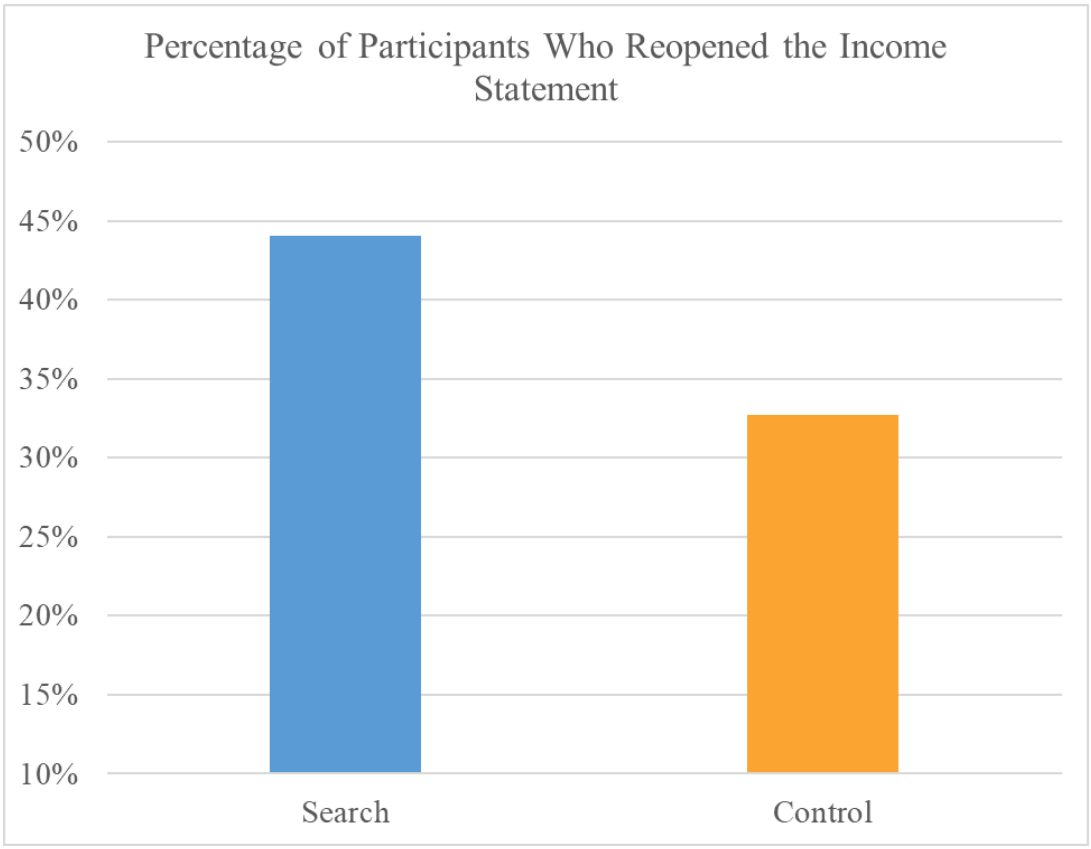


Figure 1 depicts the observed pattern of cell means for participants' investment judgments (see Table 1 Panel A). After observing ProTech's financials, by using 100-point scales participants responded the two main investment judgment questions: (i)How attractive they believe ProTech is as an investment anchored on 0="Not at all attractive" and 100="Very attractive". (ii)Their likelihood to invest in ProTech anchored on 0="Very unlikely" and 100="Very likely". Dependent variable "investment judgment" is the average of the participants responses to the above questions. Higher values reflect the more favorable investment judgments. This pattern is tested by using the ANCOVA presented Table 1 Panel B.

FIGURE 2



Participants had the opportunity to reopen the income statement during the judgment stage. This figure shows the percentage of participants within search and control conditions who reopened the income statement in the judgment stage. The difference between the likelihood to reopen the income statement in the judgment page is tested by using a logistic regression presented in Table 2 Panel C.

TABLE 1
Hypothesis Test

Panel A: Descriptive Statistics: Raw Means [standard deviations] of Investment Judgments

	Higher Likelihood of REM	*Lower Likelihood of REM*	*Row mean*
Search Engine	78.00 [17.51] *N* = 74	73.41 [19.22] *N* = 71	75.75 [18.45] *N* = 145
Control	78.54 [14.44] *N* = 79	82.25 [15.32] *N* = 71	80.30 [14.93] *N* = 150
Column Mean	78.28 [15.95] *N* = 153	77.83 [17.88] *N* = 142	78.06 [16.88] *N* = 295

Panel B: Two-Way ANCOVA Model of Investment Judgments

Source	***df***	**SS**	***F*-statistic**	***p*-value**
Financial Literacy	1	2,388.16	8.81	<0.01
Search Engine	1	1,444.19	5.33	0.02
Likelihood of REM	1	33.91	0.13	0.72
*Search Engine * Likelihood of REM*	1	1,429.25	5.27	0.01‡
Residual	290	78,601.02		

Panel C: Follow-up Simple Effects Test

Comparison	**Coding**	***t*-statistic**	***df***	***p*-value**
Search Engine/Lower Likelihood of REM versus Search Engine /Higher Likelihood of REM	1, -1, 0, 0	-1.85	288	0.03‡
Control/ Lower Likelihood of REM versus Control/ Higher Likelihood of REM	0, 0, 1, -1	1.41	288	0.08‡

Table 1 presents tests of the main hypothesis. The dependent variable "investment judgments" is the average of participants' responses to the following two questions: (i)How attractive they believe ProTech is as an investment anchored on 0="Not at all attractive" and 100="Very attractive". (ii)Their likelihood to invest in ProTech anchored on 0="Very unlikely" and 100="Very likely". In the experiment, I manipulate method of information access by a use of a Google search. In the search condition, participants asked to search the company on Google to access company financials while control condition participants were given the information directly. I also manipulate likelihood of REM by varying the company's revenue and R&D expenditures in the income statement.

TABLE 1 (continued)
Hypothesis Test

Panel A presents the descriptive statistics for investment judgments. Figure 1 provides an illustration of these results.

Panel B presents the results of the ANCOVA analysis which is used as the main test of my hypothesis. I include participants' FINRA financial literacy score as a covariate in the model.

Panel C presents follow-up simple effects tests.

[ǂ] For my directional predictions, I use one-tailed p-values. Every other reported p-values are two-tailed.

TABLE 2
Likelihood to Reopen Income Statement

Panel A: Descriptive Statistics: Percentage [*number*] of Participants Who Reopened the I/S

	Reopened the Income Statement	*Did Not Reopen the Income Statement*	*Row Total*
Search Engine	44.1% *64*	55.9% *81*	%100 *145*
Control	32.7% *49*	67.3% *101*	%100 *150*
Column Total	38.3% *113*	61.7% *182*	

Panel B: Logistic Regression for Reopening the Income Statement

Source	**Coef**	**Std Err**	***z***	***p*-value**
Search Engine	0.49	0.24	2.02	0.02[ǂ]
Constant	-0.48	0.12	3.99	<0.01

Table 2 presents the evidence for the process underlying the hypothesis. Participants had the opportunity to reopen the income statement during the judgment stage. The dependent variable "Reopen" variable takes the value of "1" if a participant reopened the income statement and "0" if she/he did not reopen. In the experiment, I manipulate method of information access by a use of a Google search. In the search condition, participants asked to search the company on Google to access company financials while control condition participants were given the information directly.

Panel A presents percentage [number] of participants who reopened the income statement within the search and control conditions. Figure 2 provides an illustration of these results.

Panel B presents the results of the logistic regression.

[ǂ] For my directional predictions, I use one-tailed p-values. Every other reported p-values are two-tailed.

TABLE 3
Recall Performance

Panel A: Descriptive Statistics: Raw Means [standard deviations] of Recall Score

	Recall Score
Search Engine	3.88 [2.25] *N* = 145
Control	4.35 [2.44] *N* = 150
Column Mean	4.12 [2.36] *N* = 295

Panel B: One-Way ANOVA Model of Recall Score

Source	***df***	**SS**	***F*-statistic**	***p*-value**
Search Engine	1	16.33	2.96	0.04ǂ
Residual	293	1,1615.28		

Table 3 presents an additional process evidence for the main hypothesis. After answering the investment judgment questions, participants responded eight recall questions regarding change and levels of income statement items. The dependent variable in this table "recall score" is the number of participants' correct responses to the eight recall questions. In the experiment, I manipulate method of information access by a use of a Google search. In the search condition, participants asked to search the company on Google to access company financials while control condition participants were given the information directly.

Panel A presents descriptive statistics of participants' recall score.

Panel B presents the one-way ANOVA model.

ǂ For my directional predictions, I use one-tailed p-values. Every other reported p-values are two-tailed.

TABLE 4
Daily Search Engine Use

Panel A: Descriptive Statistics: Raw Means [standard deviations] of Investment Judgments

	Above Median Daily Search Engine Use		*Below Median Daily Search Engine Use*		*Average Across Daily Search Engine Use*	
Search	*Higher Likelihood of REM*	*Lower Likelihood of REM*	*Higher Likelihood of REM*	*Lower Likelihood of REM*	*Higher Likelihood of REM*	*Lower Likelihood of REM*
	80.08 [14.58] N = 39	73.33 [21.30] N = 38	75.69 [20.27] N = 35	73.50 [16.85] N = 33	78.00 [17.52] N = 74	73.41 [19.23] N = 71
	76.75 [18.41] *N*=77		74.63 [18.58] *N* = 68		75.75 [18.45] *N* = 145	
Control	*Higher Likelihood of REM*	*Lower Likelihood of REM*	*Higher Likelihood of REM*	*Lower Likelihood of REM*	*Higher Likelihood of REM*	*Lower Likelihood of REM*
	75.20 [14.84] N = 38	83.17 [9.65] N = 35	81.65 [13.50] N = 41	81.36 [19.44] N = 36	78.54 [14.44] N = 79	82.25 [15.33] N = 71
	79.02 [13.16] *N*=73		81.51 [16.43] *N*=77		80.30 [14.93] *N* = 150	
Average Across Access Type	*Higher Likelihood of REM*	*Lower Likelihood of REM*	*Higher Likelihood of REM*	*Lower Likelihood of REM*	*Higher Likelihood of REM*	*Lower Likelihood of REM*
	77.67 [14.82] N = 77	78.05 [17.37] N = 73	78.90 [17.10] N = 76	77.60 [18.54] N = 69	78.28 [15.95] N = 153	77.83 [17.89] N = 142
	77.85 [16.06] *N* = 150		78.28 [17.45] *N* = 145		78.06 [16.88] *N* = 295	

TABLE 4 (continued)
Daily Search Engine Use

Panel B: 3-Way ANCOVA Model of Investment Judgments

Source	***df***	**SS**	***F*-statistic**	***p*-value**
Financial Literacy	1	2,252.02	8.31	<0.01
Search	1	1,428.59	5.27	0.02
Likelihood of REM	1	24.059	0.09	0.77
*Search * Likelihood of REM*	1	1,445.68	5.34	0.02
Daily Search Engine Use	1	38.87	0.14	0.71
*Search * Daily Search Engine Use*	1	354.71	1.31	0.25
*Likelihood of REM * Daily Search Engine Use*	1	133.67	0.49	0.48
*Search * Likelihood of REM * Daily Search Engine Use*	1	499.85	1.85	0.09‡
Residual	286	77,502.60		

Panel C: 2-Way ANCOVA Models (Search*Likelihood of REM) Using Median Split Samples

	df	**Mean Square**	***F*-statistic**	***p*-value**
*Only With Low Daily Search Engine Use Participants: Search*Likelihood of REM*	1	29.75	0.10	0.75
*Only With High Daily Search Engine Use Participants: Search*Likelihood of REM*	1	2,343.41	9.34	<0.01‡

Panel D: Linear Regression Model for Investment Judgments

$$Investment\ Judgment = \beta_0 + \beta_1 Search + \beta_2 Likelihood\ of\ REM + \beta_3 Daily\ Search\ Use + \beta_4 Search * Likelihood\ of\ REM + \beta_5 Daily\ Search\ Use * Search + \beta_6 Daily\ Search\ Use * Likelihood\ of\ REM + \beta_7 Daily\ Search\ Use * Search * Likelihood\ of\ REM + \beta_8 Financial\ Literacy + \varepsilon$$

Source	**Coeff**	**Std Err**	**t**	**p-value**
Financial Literacy	2.13	0.71	3.00	<0.01
Search	-4.04	1.17	-3.45	<0.01
Likelihood of REM	0.90	1.20	0.75	0.45
Daily Search Engine Use	0.06	0.06	0.87	0.39
*Search*Likelihood of REM*	1.12	1.22	0.92	0.36
Search Daily Search Engine Use*	0.14	0.05	2.76	<0.01
Likelihood of REM Daily Search Engine Use*	-0.04	0.05	-0.69	0.49
*Search*Likelihood of REM* Daily Search Engine Use*	0.09	0.06	-1.49	0.07‡
Constant	68.43	3.13	21.86	<0.01

TABLE 4 (continued)
Daily Search Engine Use

Table 4 presents main results partitioned on participants' daily use of search engines. The dependent variable "investment judgments" is the average of participants' responses to the following two questions (i)How attractive they believe ProTech is as an investment anchored on 0="Not at all attractive" and 100="Very attractive". (ii)Their likelihood to invest in ProTech anchored on 0="Very unlikely" and 100="Very likely". In the experiment, I manipulate method of information access by a use of a Google search. In the search condition, participants asked to search the company on Google to access company financials while control condition participants were given the information directly. I also manipulate likelihood of REM by varying the company's revenue and R&D expenditures in the income statement. After the collection of main dependent variables, participants also provided information on how many times a day they use a search engine.

Panel A presents descriptive statistics for the investment judgments partitioned based on participants' median daily use of search engines.

Panel B presents the results of the three-way ANCOVA model with the inclusion of daily use of search engines as an independent variable.

Panel C presents results of a two-way ANCOVA test after dividing the sample into two sub-samples based on median daily search engine use.

Panel D presents the moderation model with three-way interaction between experiment's manipulations and daily search engine use. Please refer below for the descriptions of independent variables used in the regression model.

Variable	**Definition**
Daily Search Engine Use:	Number of times that a participants use a search engine during an average day.
Financial Literacy:	Participants' score on FINRA financial literacy test
Likelihood of REM:	Binary variable for the likelihood of REM manipulation. It takes the value of "1" for higher likelihood of REM condition participants and "-1" for lower likelihood of REM condition participants.
Search:	Binary variable for the information access method manipulation. It takes the value of "1" for search condition participants and "-1" control condition participants.

[ǂ] For my directional predictions, I use one-tailed p-values. Every other reported p-values are two-tailed.

TABLE 5
Perceived Ease of Access

Panel A: Descriptive Statistics: Raw Means [standard deviations] of Ease of Access Judgments

	Ease of Access
Search Engine	75.80 [16.76] *N* = 145
Control	73.07 [16.85] *N* = 150
Column Mean	74.41 [16.83 *N* = 295

Panel B: One-Way ANOVA Model of Ease of Access Judgments

Source	***df***	**SS**	***F*-statistic**	***p*-value**
Search Engine	1	552.23	1.96	0.08ǂ
Residual	293	82,768.48		

Table 5 presents an additional process evidence. The dependent variable "perceived ease of access" is the average of participants' responses to two questions regarding their perception of ease information access and future availability of the information. In the experiment, I manipulate method of information access by use of a Google search. In the search condition, participants asked to search the company on Google to access company financials while control condition participants were given the information directly.

Panel A presents descriptive statistics.

Panel B presents the one-way ANOVA model.

ǂ For my directional predictions, I use one-tailed p-values. Every other reported p-values are two-tailed.

TABLE 6
Supplemental Analysis: Link vs. Search

Panel A: Descriptive Statistics: Raw Means [standard deviations] of Investment Judgments

	Higher Likelihood of REM	*Lower Likelihood of REM*	*Row mean*
Search Engine	78.00 [17.51] *N* = 74	73.41 [19.22] *N* = 71	75.75 [18.45] *N* = 145
Link Only	76.75 [18.62] *N* = 78	77.61 [18.05] *N* = 71	77.16 [18.30] *N* = 149
Column Mean	77.36 [18.04] *N* = 152	75.51 [18.70] *N* = 142	76.47 [18.36] *N* = 294

Panel B: Two-Way ANCOVA Model of Investment Judgments

Source	***df***	**SS**	***F*-statistic**	***p*-value**
Financial Literacy	1	4,846.91	15.07	<0.01
Search Engine	1	81.17	0.25	0.62
Likelihood of REM	1	394.33	1.23	0.27
*Search Engine * Likelihood of REM*	1	652.79	2.03	0.08ǂ
Residual	289	78,601.02		

Table 6 presents supplemental analysis and compares an additional link only condition to search engine condition. The dependent variable "investment judgments" is the average of participants' responses to the following two questions (i)How attractive they believe ProTech is as an investment anchored on 0="Not at all attractive" and 100="Very attractive". (ii)Their likelihood to invest in ProTech anchored on 0="Very unlikely" and 100="Very likely". In the experiment, I manipulate method of information access by a use of a Google search. In the search condition, participants asked to search the company on Google to access company financials while control condition participants were given the information directly. The experiment included an additional information access condition called "link only access". In the link only access condition, participants were given a link to be able to access the financial statements. I also manipulate likelihood of REM by varying the company's revenue and R&D expenditures in the income statement.

Panel A presents the descriptive statistics for investment judgments.

Panel B presents the results of the ANCOVA analysis. I include participants' FINRA financial literacy score as a covariate in the model.

ǂ For my directional predictions, I use one-tailed p-values. Every other reported p-values are two-tailed.

TABLE 7
Supplemental Analysis: Effect of Financial Literacy

Panel A: Descriptive Statistics: Raw Means [standard deviations] of Investment Judgments for High Financial Literacy Score Participants

	Higher Likelihood of REM	*Lower Likelihood of REM*	*Row mean*
Search Engine	80.56 [13.53] *N* = 36	76.17 [14.09] *N* = 35	78.39 [13.88] *N* = 71
Control	77.97 [13.98] *N* = 35	84.50 [9.57] *N* = 36	81.28 [12.31] *N* = 71
Column Mean	79.28 [13.72] *N* = 71	80.39 [12.64] *N* = 71	79.84 [13.15] *N* = 142

Panel B: ANOVA Model of Investment Judgments for High Financial Literacy Score Participants

Source	**df**	**SS**	***F*-statistic**	***p*-value**
Search Engine	1	292.81	1.76	0.19
Likelihood of REM	1	40.81	0.25	0.622
*Search Engine * Likelihood of REM*	1	1,056.69	6.33	<0.01[ǂ]
Residual	138	2,3003.83		

Table 7 presents the main analysis by using only the high financial literacy participants. The dependent variable "investment judgments" is the average of participants' responses to the following two questions (i)How attractive they believe ProTech is as an investment anchored on 0="Not at all attractive" and 100="Very attractive". (ii)Their likelihood to invest in ProTech anchored on 0="Very unlikely" and 100="Very likely". In the experiment, I manipulate method of information access by a use of a Google search. In the search condition, participants asked to search the company on Google to access company financials while control condition participants were given the information directly. I also manipulate likelihood of REM by varying the company's revenue and R&D expenditures in the income statement. At the end of the experiment participants responded to six questions from FINRA's financial literacy test to measure their financial literacy.

Panel A presents the descriptive statistics for investment judgments.

Panel B presents the results of the ANOVA analysis.

[ǂ] For my directional predictions, I use one-tailed p-values. Every other reported p-values are two-tailed.

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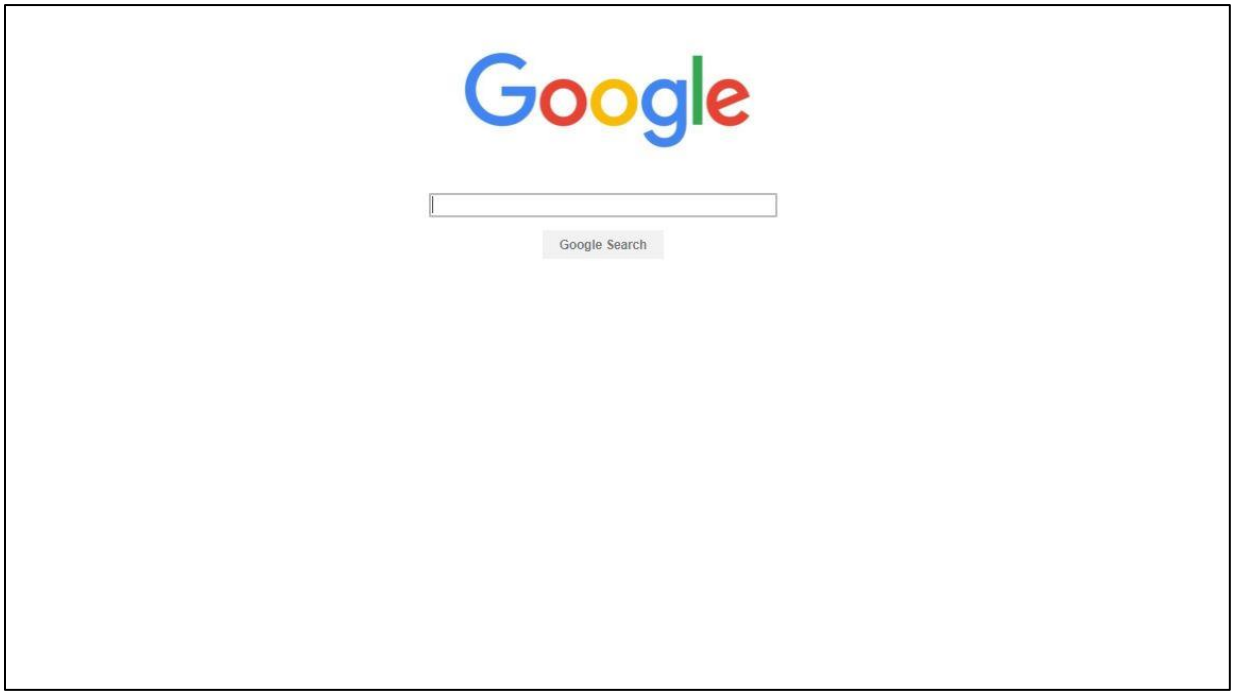
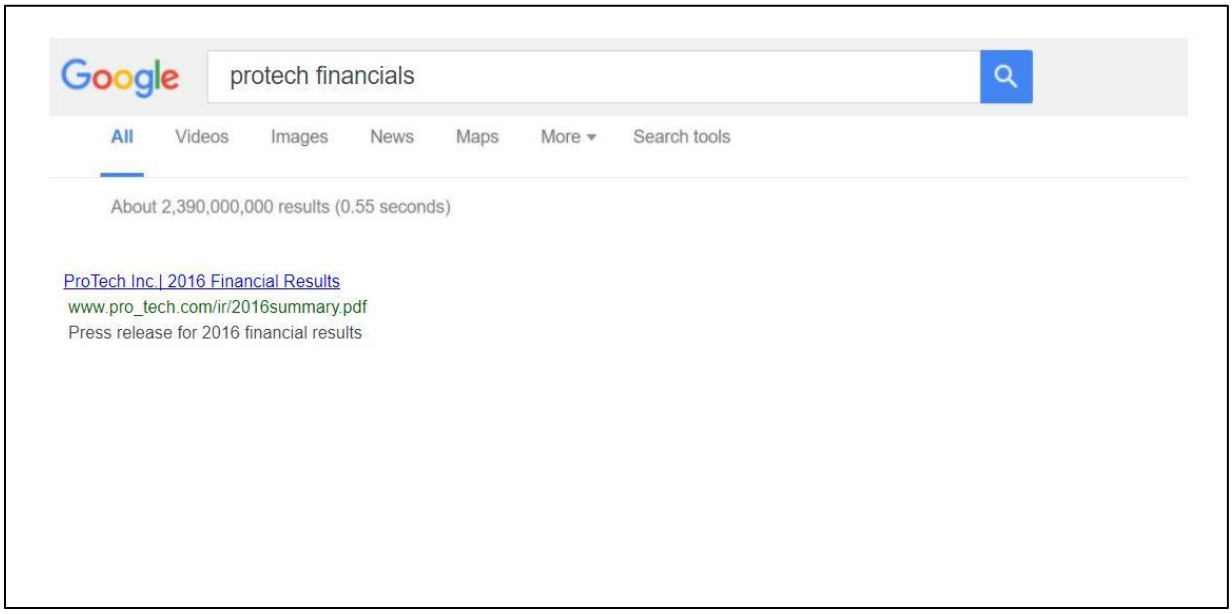
APPENDIX A: SEARCH ENGINE MANIPULATION

Panel 1: Search Screen (Search Condition Only)



Participants in the search condition needed to type a keyword related with company. Any word including the company name would take them to the link page. Participants in the control and link only conditions skipped this step.

Panel 2: After Search (Search Condition Only)



Participants in the search condition received a link similar to a Google hyperlink to access company financials after they have searched the company. Once participants clicked the link they were taken to the financial information page in the following screen. Participants in the control condition skipped this step and were given the financial information directly. Participants in the link only access condition received a similar link without the search bar on top of the screen.

APPENDIX B: LIKELIHOOD OF REAL EARNINGS MANAGEMENT MANIPULATION

Panel 1: Lower Likelihood of Real Earnings Management

PROTECH INC. REPORTS FINANCIAL RESULTS FOR THE YEAR ENDED DECEMBER 31, 2016

SAN FRANCISCO–February 25, 2017—ProTech Inc. (NASDAQ: PT) today reported preliminary financial results for the year ended December 31, 2016. The company reported 2016 net income of $183.8 million.

Condensed Income Statement (all figures in millions)
Fiscal Year ending December 31
(Unaudited)

	2016	2015	2014
Revenue	$1,404.2	$1,080.0	$900.0
Cost of Goods Sold	717.8	552.2	458.9
Gross Profit	686.4	527.8	441.1
Research and Development Expense	257.0	174.4	146.8
Selling, General & Administrative Expense	146.7	123.2	102.0
Earnings Before Income Taxes	282.7	230.2	192.3
Income Tax Expense	98.9	81.1	66.0
Net Income	$183.8	$149.1	$126.3

About ProTech: ProTech designs and creates functional human tissues using its proprietary 3D bioprinting technology.

In the lower likelihood of REM condition, participants received an income statement with higher revenues and increased research and development expenses. In both versions of the income statement net income was held constant.

Panel 2: Higher Likelihood of Real Earnings Management

PROTECH INC. REPORTS FINANCIAL RESULTS FOR THE YEAR ENDED DECEMBER 31, 2016

SAN FRANCISCO–February 25, 2017—ProTech Inc. (NASDAQ: PT) today reported preliminary financial results for the year ended December 31, 2016. The company reported 2016 net income of $183.8 million.

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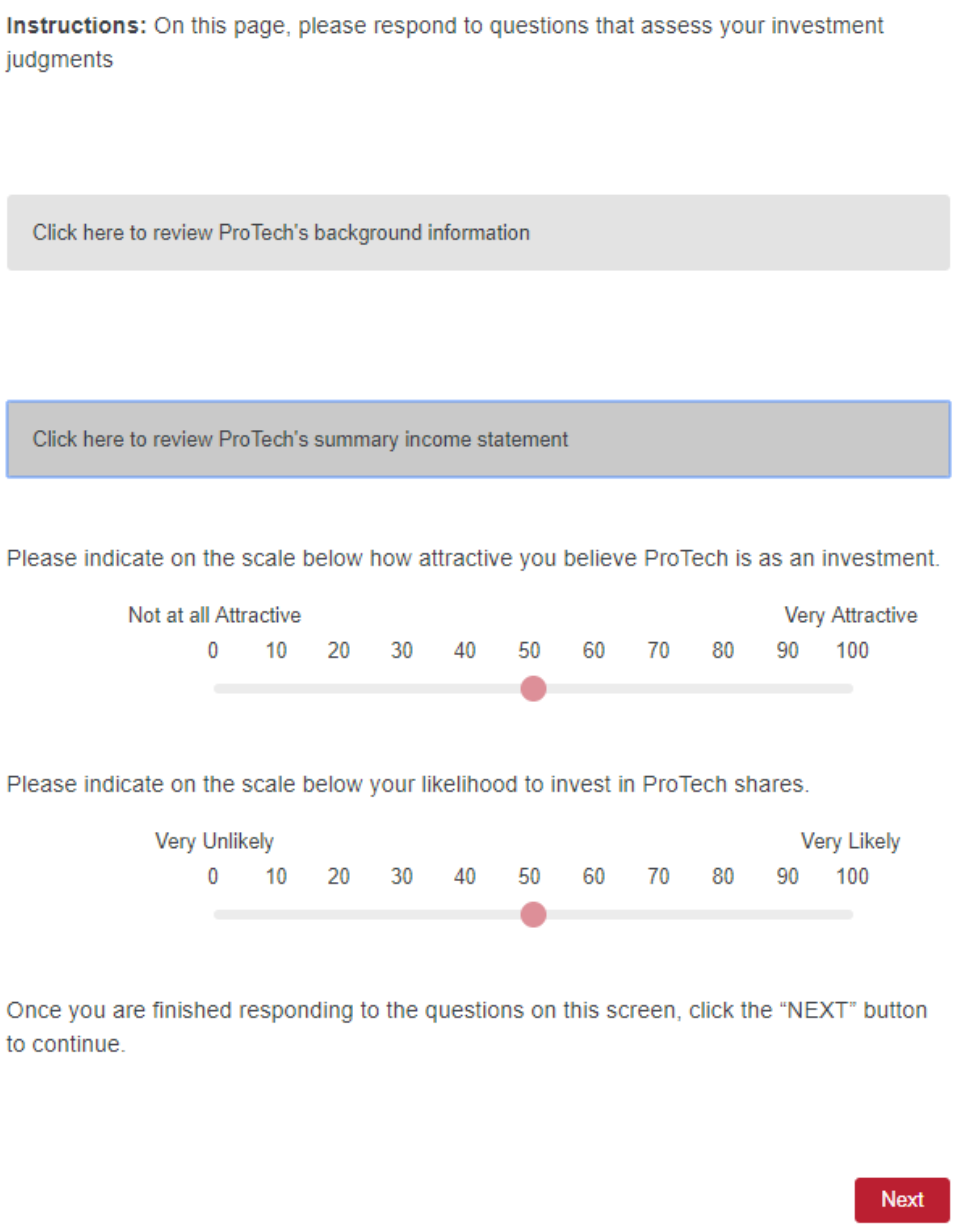
	2016	2015	2014
Revenue	$1,188.2	$1,080.0	$900.0
Cost of Goods Sold	617.7	552.2	458.9
Gross Profit	570.5	527.8	441.1
Research and Development Expense	141.1	174.4	146.8
Selling, General & Administrative Expense	146.7	123.2	102.0
Earnings Before Income Taxes	282.7	230.2	192.3
Income Tax Expense	98.9	81.1	66.0
Net Income	$183.8	$149.1	$126.3

About ProTech: ProTech designs and creates functional human tissues using its proprietary 3D bioprinting technology.

In the higher likelihood of REM condition, participants received an income statement with lower revenues and decreased research and development expenses. In both versions of the income statement net income was held constant.

APPENDIX C: DEPENDENT VARIABLE COLLECTION SCREEN



Participants were able to click the links above to reopen the income statement and background information in the screen where they answered the questions that served as my main dependent variable.

APPENDIX D: EXPERIMENTAL INSTRUMENT

The following pages provide screenshots of the experimental instrument from Qualtrics. Additional information is provided in brackets.

[Instructions Page]

GENERAL INSTRUCTIONS

In this study, you will assume the role of a potential investor, evaluating information about ProTech, Inc., a hypothetical company. Your primary goal in this study is to provide a series of judgments related to ProTech's performance and management. In addition, you will be asked a number of questions about your judgments and your experience. Your participation today will take approximately 20-25 minutes.

The information included in the case is not intended to be completely representative of what would normally be available when evaluating a company and its management. Providing you with that level of detail would require more time to complete the case than could realistically be requested. Please make the best judgments you can based on the information provided in these materials.

On the last screen of the study, you will be provided with a survey code. You are required to type the survey code into a text field in the Amazon Mechanical Turk system in order to be paid $2.00 for your participation in the study.

Once you have reviewed the information on this screen, click the “NEXT” button to continue.

Next

[Background Information]

Instructions: In this experiment, you are a potential investor and you are considering investing in ProTech Inc. ProTech designs and creates functional human tissues using its proprietary 3-D bioprinting technology. On this page, you can find ProTech's background information and an excerpt from its significant accounting policies.

ProTech, Inc.

About ProTech Inc.

ProTech designs and creates functional human tissues using its proprietary 3D bioprinting technology. With reproducible 3D tissues that accurately represent human biology, ProTech is enabling ground-breaking therapies. 3D human tissues have the potential to accelerate the drug discovery process, enabling treatments to be developed faster and at lower cost. ProTech partners with biopharmaceutical companies and academic medical centers to build and validate more predictive in vitro tissues for toxicology and high-value drug profiling. By giving researchers a solution they have never had before – the opportunity to evaluate drugs on functional human tissue before ever administering the drug to a living human being – ProTech is bridging the gap between preclinical testing and clinical trials. ProTech conducts early research on specific tissues for therapeutic use to repair or replace damaged or diseased tissues.

Significant Accounting Policies

In accordance with U.S. GAAP, revenue is recognized when earned. All research and development expenditures are recorded as an expense when incurred.

Once you have reviewed the information on this screen, click the "NEXT" button to continue.

Next

[Instructions for Search Engine Condition]

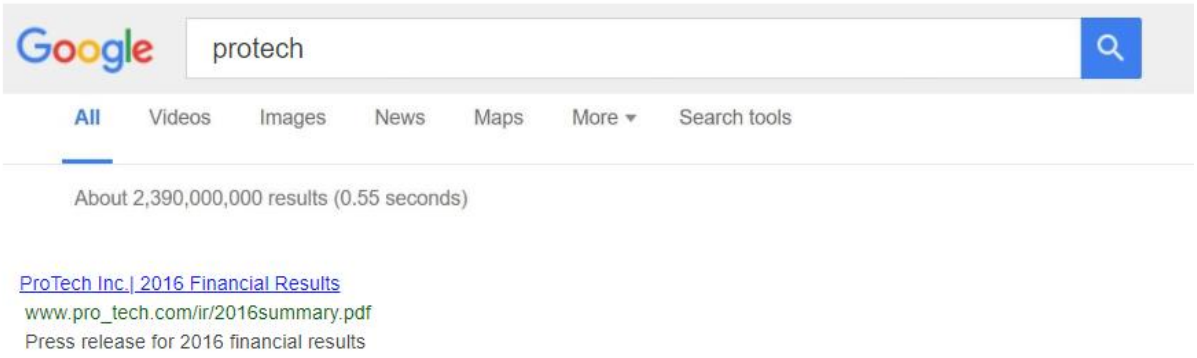
Instructions: You recently discovered that ProTech is releasing their earnings for the year ended December 31, 2016. While considering investing in ProTech, you decided to learn more about the company.

On the following page, by googling ProTech, you can access ProTech's press release for the financial results for the year ended December 31, 2016.

Next

[Keyword Search Page (Search Engine Condition Only)

[Search Result Page]



[Instructions for Control Condition]

Instructions: You recently discovered that ProTech is releasing their earnings for the year ended December 31, 2016. While considering investing in ProTech, you decided to learn more about the company.

On the following page, you can access ProTech's press release for the financial results for the year ended December 31, 2016.

Next

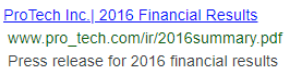
[Instructions for Link Only Access Condition]

Instructions: You recently discovered that ProTech is releasing their earnings for the year ended December 31, 2016. While considering investing in ProTech, you decided to learn more about the company.

On the following page, by clicking the link provided, you can access ProTech's press release for the financial results for the year ended December 31, 2016.

Next

[Link Page (Link Only Access Condition): Instead of using the keyword search function participants in the link only condition received the following link directly. Once participants clicked the link they were taken to the financial information page in the following screen.**]**



[Lower Likelihood of Real Earnings Management – Summary Income Statement]

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SAN FRANCISCO–February 25, 2017—ProTech Inc. (NASDAQ: PT) today reported preliminary financial results for the year ended December 31, 2016. The company reported 2016 net income of $183.8 million.

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Fiscal Year ending December 31
(Unaudited)

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Selling, General & Administrative Expense	146.7	123.2	102.0
Earnings Before Income Taxes	282.7	230.2	192.3
Income Tax Expense	98.9	81.1	66.0
Net Income	$183.8	$149.1	$126.3

About ProTech: ProTech designs and creates functional human tissues using its proprietary 3D bioprinting technology.

Once you have reviewed the information on this screen, click the "Next" button to continue

Next

[Higher Likelihood of Real Earnings Management – Summary Income Statement]

PROTECH INC. REPORTS FINANCIAL RESULTS FOR THE YEAR ENDED DECEMBER 31, 2016

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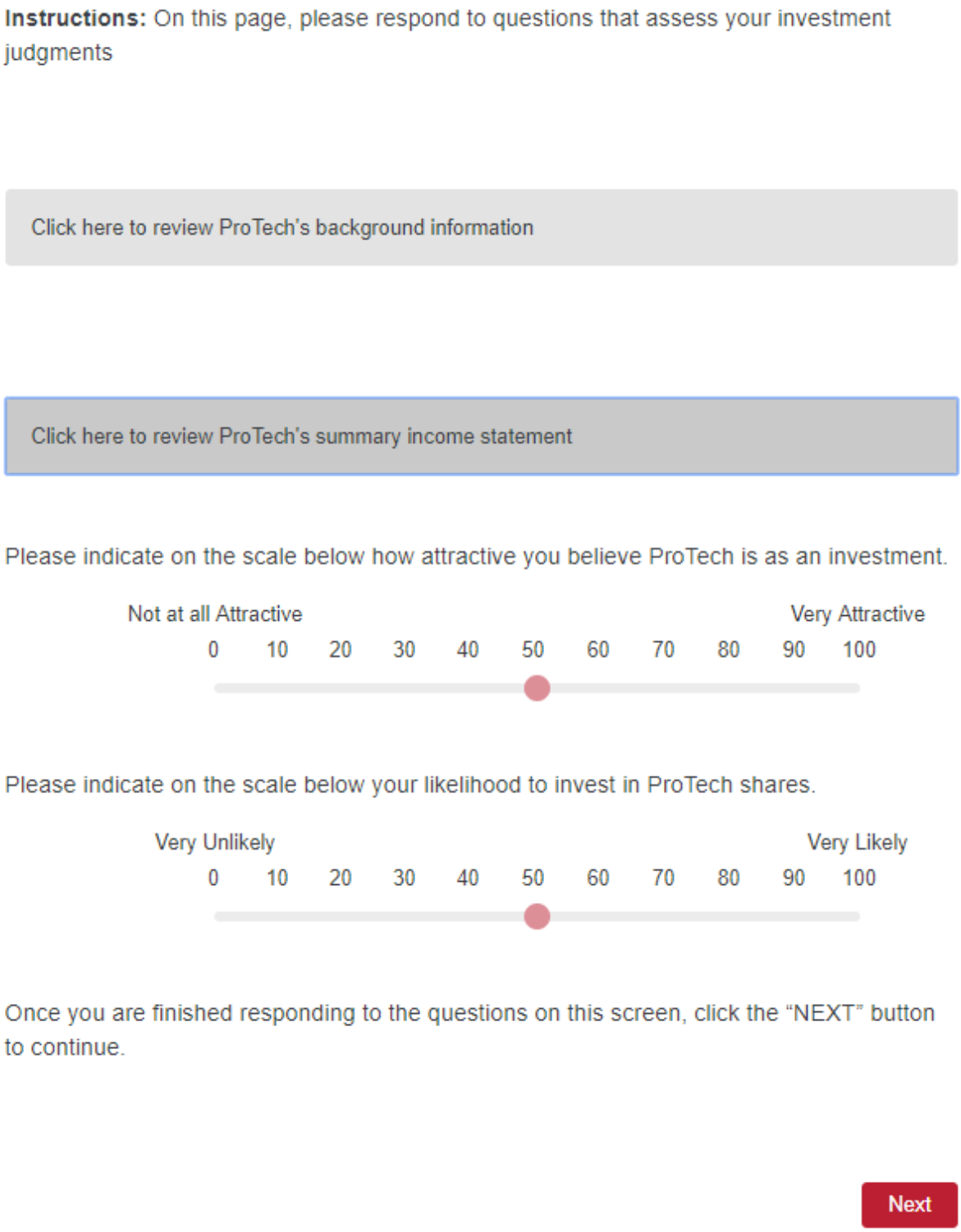
Selling, General & Administrative Expense	146.7	123.2	102.0
Earnings Before Income Taxes	282.7	230.2	192.3
Income Tax Expense	98.9	81.1	66.0
Net Income	$183.8	$149.1	$126.3

About ProTech: ProTech designs and creates functional human tissues using its proprietary 3D bioprinting technology.

Once you have reviewed the information on this screen, click the "Next" button to continue

Next

[Main Dependent Variable Collection Screen (Same for all conditions): Participants can click the highlighted box to reopen the financial statements within the same screen. They can also reopen the background information by clicking the top link.**]**



[Process and Additional Measures (Same for all conditions) Collection Screens]

Instructions: On this page, please allocate 100 points to earnings statement items in terms of importance while evaluating ProTech's future financial performance.

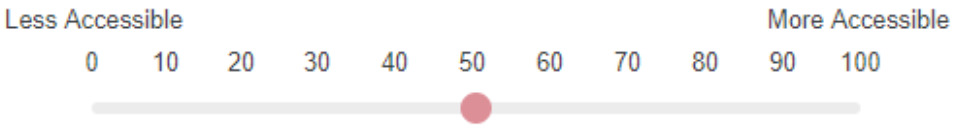
Below is a list of metrics that were disclosed in ProTech's financial results announcement. Allocate 100 points across the following metrics based on how important you believed each metric was in evaluating ProTech. Allocate more points to those metrics you believed are more important. The total points allocated must add up to 100.

Net Income	0
Revenues	0
Cost of Goods Sold	0
Gross Margin	0
Research and Development Expense	0
Selling, General and Administrative Expenses	0
Total	0

Once you are finished responding to the questions on this screen, click the "NEXT" button to continue.

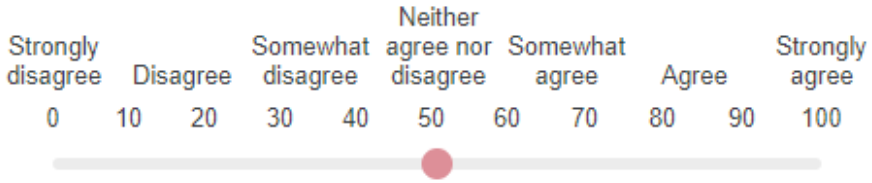
Next

Compared to your previous experience in gathering information, how accessible was ProTech's financial information?



Please indicate how much you agree with the following statement:

"*After observing ProTech's financial information the first time, I believed that the information would be accessible to me in the later stages.*"



Once you are finished responding to the questions on this screen, click the "NEXT" button to continue.

Next

Instructions: The following questions relate to ProTech's financial statements you viewed for the period ended on December 31, 2016.

What was the amount of Net Income reported for 2016?

- Less than $100 million
- Between $100 million - $150 million
- Between $150 million - $200 million
- Greater than $200 million

How certain are you of your response in the previous question regarding the amount of Net Income reported for 2016?

Not at All Certain — Very Certain

0 10 20 30 40 50 60 70 80 90 100

Please indicate how ProTech's reported 2016 Net Income compared to ProTech's reported 2015 Net Income.
ProTech's reported 2016 Net Income was _____ than ProTech's reported 2015 Net Income.

More than $40 million lower	Between $20 million - $40 million lower	Between $0-$20 million lower	Not different	Between $0-$20 million higher	Between $20- $40 million higher	More than $40 million higher

How certain are you of your response in the previous question regarding the amount of Net Income reported for 2016 compared to 2015 ?

Not at All Certain — Very Certain

0 10 20 30 40 50 60 70 80 90 100

Once you are finished responding to the questions on this screen, click the "NEXT" button to continue.

Next

Instructions: The following questions relate to ProTech's financial statements you viewed for the period ended on December 31, 2016.

What was the amount of reported Revenue for 2016?

- Less than $1,000 million
- Between $1,000 million - $1,250 million
- Between $1,250 million - $1,500 million
- Greater than $1,500 million

How certain are you of your response in the previous question regarding the amount of Revenues reported for 2016 ?

Not at All Certain — Very Certain

0 10 20 30 40 50 60 70 80 90 100

Please select "Yes" if you are a robot.

- Yes
- No

Please indicate how ProTech's reported 2016 Revenues compared to ProTech's reported 2015 Revenues.
ProTech's reported 2016 Revenues were _____ than ProTech's reported 2015 Revenues.

More than $400 million lower	Between $200 million - $400 million lower	Between $0-$200 million lower	Not different	Between $0-$200 million higher	Between $200-$400 million higher	More than $400 million higher

How certain are you of your response in the previous question regarding the amount of Revenues reported for 2016 compared to 2015 ?

Not at All Certain — Very Certain

0 10 20 30 40 50 60 70 80 90 100

Once you are finished responding to the questions on this screen, click the "NEXT" button to continue.

Next

Instructions: The following questions relate to ProTech's financial statements you viewed for the period ended on December 31, 2016.

What was the amount of Research and Development expense reported for 2016?

- Less than $100 million
- Between $100 million - $200 million
- Between $200 million - $300 million
- Greater than $300 million

How certain are you of your response in the previous question regarding the amount of Research and Development Expense reported for 2016 ?

Not at All Certain — Very Certain

0 10 20 30 40 50 60 70 80 90 100

Please indicate how ProTech's reported 2016 Research and Development Expenses compared to ProTech's reported 2015 Research and Development Expenses.

ProTech's reported 2016 Research and Development Expenses were _____ than ProTech's reported 2015 Research and Development Expenses.

More than $50 million lower	Between $25 million - $50 million lower	Between $0-$25 million lower	Not different	Between $0-$25 million higher	Between $25- $50 million higher	More than $50 million higher

How certain are you of your response in the previous question regarding the amount of Research and Development Expenses reported for 2016 compared to 2015 ?

Not at All Certain — Very Certain

0 10 20 30 40 50 60 70 80 90 100

Once you are finished responding to the questions on this screen, click the "NEXT" button to continue.

What was the amount of reported Selling, General and Administrative Expenses (SG&A) for 2016?

- Less than $100 million
- Between $100 million - $150 million
- Between $150 million - $200 million
- Greater than $200 million

How certain are you of your response in the previous question regarding the amount of SG&A Expenses reported for 2016 ?

Not at All Certain — Very Certain

0 10 20 30 40 50 60 70 80 90 100

Please indicate how ProTech's reported 2016 SG&A compared to ProTech's reported 2015 SG&A.
ProTech's reported 2016 SG&A was _____ than ProTech's reported 2015 SG&A.

More than $40 million lower	Between $20 million - $40 million lower	Between $0-$20 million lower	Not different	Between $0-$20 million higher	Between $20- $40 million higher	More than $40 million higher

How certain are you of your response in the previous question regarding the amount of SG&A reported for 2016 compared to 2015 ?

Not at All Certain — Very Certain

0 10 20 30 40 50 60 70 80 90 100

For the period ended 12/31/2016, overall ProTech's earnings components (e.g., revenue, R&D expenses) were:

- Less favorable information relative to 2015
- More favorable information relative to 2015

In the box below, please provide a detailed explanation for your choice directly above

Once you are finished responding to the questions on this screen, click the "NEXT" button to continue.

Next

Instructions: The following questions relate to ProTech's financial statements you viewed for the period ended on December 31, 2016.

Did you use a Google search to access the company's 2016 financial information?

- Used a Google search to access ProTech's 2016 financial information
- Did not use a Google search to access ProTech's 2016 financial information

Before receiving ProTech's background information and financial results for 2016, what was your investment status in ProTech?

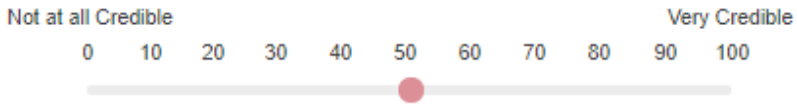
- I had already invested in ProTech
- I had not invested in ProTech

Once you are finished responding to the questions on this screen, click the "NEXT" button to continue.

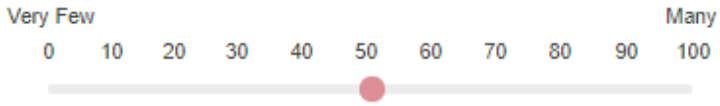
Next

Instructions: The following questions solicit your judgments about ProTech's management and the financial reports they provide.

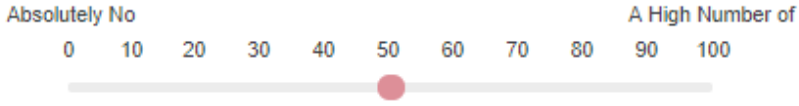
I believe that the financial results provided by ProTech Management were _____.



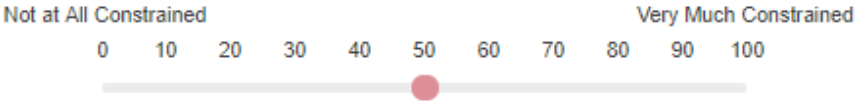
I believe that ProTech's management has _____opportunities to manage its earnings.



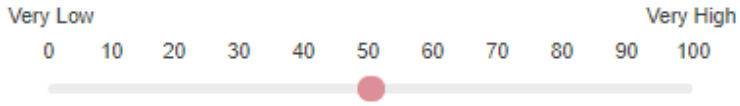
I believe that ProTech's management has _____motives and incentives to manage its earnings.



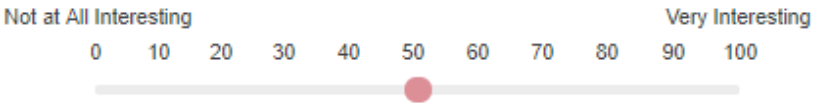
I believe that ProTech's management is _____in terms of how they might manage earnings.



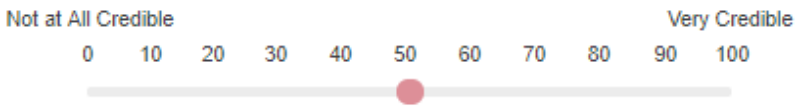
I believe that the quality of ProTech's 2016 reported Net Income is _____.



Please select forty for this question _____.



I believe that ProTech's management is _____.



[Demographics Information Collection Screens]

Instructions: In the next couple of pages you will be asked questions regarding your technology use habits as well as some demographics questions. Please answer the questions truthfully. Your answers to these questions will not affect your payment outcomes.

What is your age?

- 18 to 24 years
- 25 to 34 years
- 35 to 44 years
- 45 to 54 years
- 55 to 64 years
- Age 65 or older

What is your highest level of education?

- Less than high school
- High school graduate
- Some college
- 2 year degree
- 4 year degree
- Master's / Professional degree
- Doctorate

How many years have you been using a computer?

- Less than a year
- 1 to 3 years
- 3 to 5 years
- 5 to 10 years
- 10 to 15 years
- 15 years or more

How many years have you been using the internet?

- Less than a year
- 1 to 3 years
- 3 to 5 years
- 5 to 10 years
- 10 to 15 years
- 15 years or more

Once you are finished responding to the questions on this screen, click the “NEXT” button to continue.

On average, how many hours do you spend in front of a computer screen during a day? (The number of total hours should include time spent in front of computers, as well as smart devices such as tablets and smartphones.)

# of Hours Spent in Front of a Computer Screen

On average, how many hours do you spend on the internet during a day? (The number of total hours spent online should include time spent on social media, reading blogs and news articles, shopping and actively searching information but should not include time spent watching long videos from streaming services such as Netflix or listening music.)

# of Hours Spent Online

On average, how many times a day do you search for information on search engines such as Google?

# of Search Queries per Day

How often do you use search engines such as Google?

Very rarely 0	1	2	3	4	5	All the time 6

On average, how many hours do you spend on smart devices during a day? (The number of total hours spent on smart mobile devices should include time spent on smartphones and tablets.)

# of Hours Spent on Smart Devices

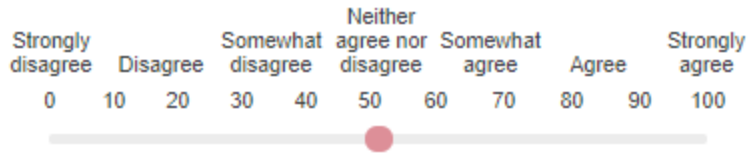
How familiar are you with the internet?

Not familiar at all 0	1	2	Moderately familiar 3	4	5	Extremely familiar 6

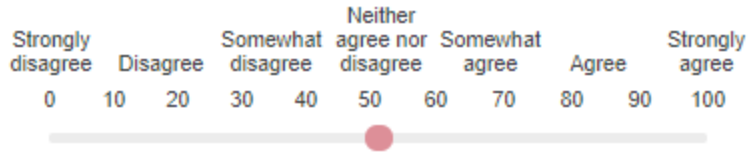
Once you are finished responding to the questions on this screen, click the “NEXT” button to continue.

Instructions: On this page, please indicate how much you agree with the following statements:

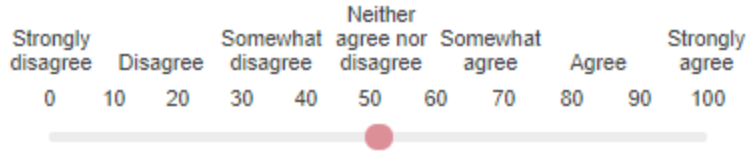
"When I encounter questions I don't know the answer to, I have an urge to search online"



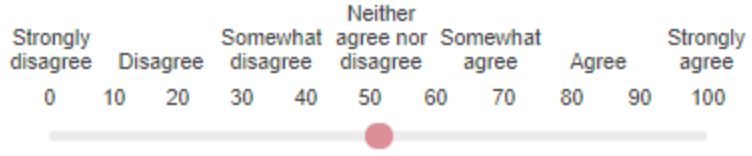
"If I can't remember factual information, I google it"



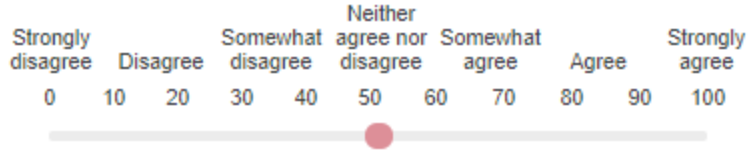
"I use Google and other search engines as my main portal for information access."



"I would feel lost if I were unable to go online"



"I find it difficult to control my internet use"



Once you are finished responding to the questions on this screen, click the "NEXT" button to continue.

How often do you perform the following online activities?

	Never	Sometimes	About half the time	Most of the time	Always
E-mails	○	○	○	○	○
Information Gathering	○	○	○	○	○
Online Shopping	○	○	○	○	○
Work	○	○	○	○	○
Social Media	○	○	○	○	○
Games	○	○	○	○	○
Chatting / Participating in Online Communities	○	○	○	○	○
Studying	○	○	○	○	○

Is the homepage on your computer a search engine page such as www.google.com?

- Yes
- No

Do you own a smartphone or a tablet?

- Yes
- No

Which web browser are you using to fill out this survey?

- Google Chrome
- Microsoft Edge
- Mozilla Firefox
- Opera
- Safari
- Internet Explorer
- Other

Did you use a smartphone or a tablet to fill out this survey?

- Yes
- No

Once you are finished responding to the questions on this screen, click the "NEXT" button to continue.

Next

[Accounting Background Information Collection Screen]

Instructions: On this screen, please answer several demographic questions.

How many accounting courses have you taken in total, including the courses in which you are currently enrolled?

How many finance courses have you taken in total, including the courses in which you are currently enrolled?

Have you taken a course where financial statement analysis was a primary focus, including any courses in which you may be currently enrolled?

- Yes
- No

How many times have you evaluated a company's performance by analyzing its financial statements?

- This was the first time
- 1 – 5 times
- 6 – 10 times
- More than 10 times

Have you ever bought or sold an individual company's common stock or debt securities?

- Yes
- No

Do you plan to invest in an individual company's common stock or debt securities in the next five years?

Yes

No

Once you are finished responding to the questions on this screen, click the "NEXT" button to continue.

[Financial Literacy Quiz]

Instructions: On this screen, please answer several investment related questions. Please refrain from using external help and tools while answering these questions. Your answers to the questions found on this page will not have an effect on your payment.

Suppose you have $100 in a savings account earning 2 percent interest a year. After five years, how much would you have?

- More than $102
- Exactly $102
- Less than $102
- Don't know/Not sure

Imagine that the interest rate on your savings account is 1 percent a year and inflation is 2 percent a year. After one year, would the money in the account buy more than it does today, exactly the same, or less than today?

- More
- Same
- Less
- Don't know/Not sure

If interest rates rise, what will typically happen to bond prices? Rise, fall, stay the same, or is there no relationship?

- Fall
- Rise
- Stay the same
- Don't know/Not sure

A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage but the total interest over the life of the loan will be less.

- True
- False
- Don't know/Not sure

Buying a single company's stock usually provides a safer return than a stock mutual fund.

- True
- False
- Don't know/Not sure

Suppose you owe $1,000 on a loan and the interest rate you are charged is 20% per year, compounded annually. If you didn't pay anything off, at this interest rate, how many years would it take for the amount you owe to double?

- Less than 2 years
- 2 to 4 years
- 5 to 9 years
- More than 10 years
- Don't know/Not sure

Once you are finished responding to the questions on this screen, click the "NEXT" button to continue.

[Payment Screen]

Thank you for participating.
Your validation code is:
1928460040
To receive payment for participating, click "Accept HIT" in the Mechanical Turk window, enter this validation code, then click "Submit".